DOCUMENT RESUME

ED 189 352 CE 025 722

AUTHOR Mook, Corena; Legg, Marilyn
TITLE Project: Strategies for Sex Fairness. Math and Science for All.
INSTITUTION Kansas State Univ., Manhattan. Coll. of Education.
SPONS AGENCY Kansas State Dept. of Education, Topeka. Div. of Vocational Education.
NOTE 26p.; Not available in paper copy due to colored paper. For related documents see CE 025 705-706 (student instructional packets); CE 025 707-717 and CE 025 719-721 (inservice packets); and CE 025 729 (outreach packet). Not all packets in this series are in ERIC: for full listing available from the publisher see any packet.
AVAILABLE FROM Dr. Frank Slapar, Director, Kansas Curriculum Materials Dissemination Center, 207 Whitesitt Hall, Pittsburg State University, Pittsburg, KS 66762 ($1.50 per packet; $45.00 for set of thirty).

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS *Career Guidance; Classroom Techniques; Inservice Teacher Education; Lesson Plans; Mathematics; Mathematics Anxiety; *Mathematics Education; Postsecondary Education; *Science Education; Sciences; Secondary Education; *Sex Fairness; *Sex Stereotypes; Student Attitudes; Teacher Influence
IDENTIFIERS Kansas

ABSTRACT

One of a series of instructional packets to aid schools in reducing sex stereotypes, this inservice guide for use with school personnel is designed to increase awareness of the extent to which Kansans limit their career options by avoiding math and science. Focus is on why people do not develop more math knowledge and/or skills (such as mathophobia, math anxiety and socialization influences) and how to counter these causes. Suggested time-frame for presentation is sixty to ninety minutes. Contents include a leader's script (material to be presented), a transparency master, and four handout masters. Included are lists of science and math related occupations, outline of sex differences in math skills, self-test and feelings about math, strategies to counter math anxiety, and list of projects conducted to encourage women into math and science. The packet is designed for use alone, in combination with other packets (see Note), or to supplement existing inservice units. (JT)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED189352

PROJECT: STRATEGIES FOR SEX FAIRNESS
College of Education
Kansas State University

MATH AND SCIENCE FOR ALL

A Vocational Education SPECIAL PROJECT
Kansas State Department of Education

CE 025 722

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Corona Mook

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

PROJECT: STRATEGIES FOR SEX FAIRNESS
College of Education
Kansas State University

MATH AND SCIENCE FOR ALL

A Vocational Education SPECIAL PROJECT
Kansas State Department of Education

type t.p.,
attach stickers,
& write in CE #.

CE 025 722

Project: Strategies for Sex Fairness
College of Education, Kansas State University

SEX FAIRNESS PACKETS PRICE PER PACKET $1.50

The packets are designed to aid Kansas schools in reducing limitations that sex stereotyping imposes on option choices for boy and girl students. Each packet incorporates affective with cognitive learning to facilitate thinking and discussion. A packet's material can be used alone, in combination with other packets, or to supplement existing instructional/ in-service/out-reach units. Included are complete instructions for using the enclosed script, visual aids, transparency masters, handout masters, or group activities to cover 40-50 minute time periods. Packets are available for schools to address three different fronts - instructional packets for use with junior high or older students, in-service packets for use with school personnel, and out-reach packets for use with community groups.

INSTRUCTIONAL PACKETS:

'Does Occupational Stereotyping Need to Limit Choice?'
Students think through the process of narrowing their occupational options to a choice pool that reflects their interests, abilities, and values. Consideration is given whether occupational stereotyping is a valid reason for removing occupations from one's choice pool.

'Focus on the Future: Changing Lives'
Students are encouraged to think about today's world and the increased flexibility being prepared for both a job and managing a home brings to future choices.

'What Would I Do If That Were I'
Students consider present or potential life situations to explore traditional and nontraditional alternatives. The purpose is to assist in values clarification regarding sex roles.

'My Legal Right - Expanding Male Options'
Students demonstrate the legal right men have to be hired in nontraditional occupations via skit form.

'My Legal Right - Expanding Female Options'
Students demonstrate the legal right women have to be hired in nontraditional occupations via skit form.

'Is My Textbook Limiting Me in Considering Future Roles?'
Students consider that today's world is changing so rapidly textbooks cannot keep up in reflecting society. By recognizing textbook bias that limits choices, students can choose to ignore these limitations.

'Is My Guidance Text Limiting Me in Considering Future Roles?'
Students explore if and how interest inventories limit consideration of occupational options for boys and girls.

IN-SERVICE PACKETS:

'Changing Lives: Future Trends'
Considers the rapidly changing society and expanded skills and resources students need to acquire and face the future.

'My Role as a Change Agent'
Gives the theoretical base that can guide school personnel in creating attitudinal changes in other people.

'My School's Role as a Change Agent'
Explores how institutions can create attitudinal change in its surrounding environment.

'Legislation's Push for Sex Fairness'
Reviews legislation affecting schools and interpreted implications.

'Recognizing My Fair and Unfair Behavior'
Explores how our biases govern our attitudes and actions toward others. Biases are then examined to select those we want to remove/keep in our internal valuing system.

'Evaluating Our School for Sex Fairness'
Discussion of the process a school undergoes in establishing an evaluation that reflects its environmental circumstances.

' Instructional Material - Usage Despite Bias'
Explores how bias can occur in instructional material and methods of counteracting its influence on students.

'Guidance Tests - Usage Despite Bias'
Explores how bias can occur in guidance tests and approaches to reduce any bias during usage.

'The Academic Teacher - Encouraging Non-Traditional Options'
Considers the role academic teachers can take in expanding options for students.

'Vocational Teacher - Encouraging Non-Traditional Options'
Suggests steps vocational teachers can take that makes students less hesitant to consider non-traditional options.

'Counselor - Encouraging Non-Traditional Options'
Presents several different approaches with suggested accompanying activities from which counselors can choose for encouraging students to consider nontraditional careers.

'Creating a Sex-Fair School Environment'
Explores diverse fronts to be considered and action planning stages for a school.

'Differences Between a Girl and Boy?'
Presents what current research shows may be differences by developmental stages.

'Profile of a Non-Traditional Student'
Written by an educational director in industry who relates the problems he observes women face personally and professionally when working in a non-traditional field. Recommendations are made for improving preparation for non-traditional students.

'Home Economics for All'
Suggest approaches that encourage boys/girls to acquire home management skills and consider home economics related occupations.

'Math and Science for All'
Suggest approaches that encourage girls/boys to acquire sufficient math and science skills that occupational options can remain open.

OUT-REACH PACKETS

'Future Trends Create Changing Lives'
Considers the rapidly changing society and expanded skills and resources today's youth need to cope with the future.

'Society's Messages to Youth'
Explores messages coming from diverse sources of a child's environment and how they can limit options a child considers.

'Community Groups-Helping Face the Future'
Considers alternative approaches community groups can take to aid in expanding option choices for today's youth.

'Business and Industry-Helping Face the Future'
Considers alternative measures that business and industry can take to aid schools expand option choices for their students.

'Parents-Helping Your Child Face the Future'
Explores the role parents can play in limiting or expanding option choices for their children.

'New Options in Choosing Vocational Training'
Developed for use with groups of potential students to encourage both boys and girls to consider all course offerings of a school.

'Re-entering the Work Force-New Options'
Developed for use with older groups of potential students or displaced homemakers to encourage considerations of expanded occupational choices.

INSTRUCTIONS

The purpose of this in-service packet is to increase awareness of the extent to which Kansans limit their career options by avoiding math and science. Discussed are some of the reasons why people do not develop more math knowledge and/or skills - such as mathophobia, math anxiety, and socialization influences. Included are suggestions for ways to counter these causes, plus ways to encourage Kansans to take more math and science.

This packet may be used alone or to supplement other in-service activities. Its main focus is to create understanding of the issues involved, in 60-90 minutes.

You will find included in this packet:

1. A Leader's script. This script has action guide notations in the right-hand column.

2. Two resource lists to aid in stimulating group response.
   . Some Science and Related Occupations
   . Some Math and Related Occupations

3. One transparency master.
   . Sex Differences in Math Skills

   By covering the master with a sheet of transparency film and running both the sheet and master through a Thermafax machine, a transparency for use with an overhead projector can be produced.

4. Four handout masters.
   . My Feelings about Math
   . Strategies to Counter Math Anxiety
   . Efforts to Encourage Women into Math and Science
   . Efforts to Encourage (page 2)

   Copies of these handouts for distribution can be made by using any copying machine or by using a Thermafax machine to make a ditto master.

A suggested general format for this in-service unit is:

1. Before the presentation, the leader should
   a. become familiar with the script through pre-reading, making modifications to fit your audience or speaking style.
   b. set up the overhead projector.
   c. make sure a blackboard or easel with newsprint pad is available to note group response suggestions.

2. The leader reads the script to the group, incorporating the action guide notations in the right-hand column when appropriate.

When people think of occupations in mathematics and science or related occupations, they immediately envision a teacher, a scientist in a long white lab coat, or perhaps an engineer engrossed in blueprints. These visions paint just a small fragment of the whole picture. Any occupation that requires an understanding of how our world works is science-related. Usually, understandings of our world are stated in mathematical forms. Thus, workers in science and science-related occupations need to feel comfortable dealing with numbers. In many cases, math-related and science-related occupations are closely connected. There has been an explosion in the number of math-related careers--primarily due to the widespread use of computers and the availability of inexpensive hand-held calculators.

Just how many occupations involve mathematical or scientific knowledge and/or skill? To gain some idea of the diversity and breadth, let us see how many occupations we can name today. I will start with a few examples in each category - then add your suggestions. ---***---

*** Encourage response from the group

(Have a blackboard or large newsprint pad with easel available for writing on. Make two column headings: Math-related Occupations; Science-related Occupations. Under each column heading, give several examples to stimulate audience feed-in; under math-related occupations put accountant, computer console operator, floor covering installer; under science-related occupations put biologist, butcher, air-conditioning mechanic. If response is slow, add several occupations that are not usually thought of. To aid in this, two resource lists titled "Some Science and Related Occupations" and "Some Math and Related Occupations" are included in this packet.)

The number of occupations that involve mathematical or scientific knowledge and/or skill quickly becomes overwhelming. And each year the list becomes longer as more and more fields are incorporating computers for management, in the process creating new job titles that have not yet

found their way into the Dictionary of Occupational Titles. These new jobs offer great opportunity for potential wage-earners. Fields are scrambling for workers able to integrate computer technology and usage into current activities. Almost any article you read that forecasts future labor market supply and demand stresses the great growth ahead in technological fields.

Yet in Kansas many of our high school students take only as much math and science as is absolutely necessary to meet graduation requirements. For most schools, students need only one year of math - and this can be general math - to graduate. These same students usually take as little science as necessary, since chemistry and physics usually involve formulae and numbers. In avoiding advanced courses, these students have slammed the door shut on math-related and science-related career options --or at least greatly limited their opportunities in these fields. A high barrier has been created that must be overcome if such a career choice is made later in life. Because of this, mathematics has been termed a "critical filter" to present and future career opportunities.

If mathematics is such a "critical filter," why do so many students stop studying it so early? One contributing factor may be that students have not been exposed to any career education that points out how important math is in keeping career options open - they just do not know that they are limiting themselves. This factor seems easy to remedy. Eighth and ninth grade math teachers could include discussion of how mathematics is used in various careers and life styles in their classes. Counselors could advise the continuation of study in math as they assist with student enrollment. Posters, community resource people, articles in school newspapers, all can help spread the word.

Other contributing factors may not be as easy to counter. Many

boys and girls - as well as men and women - have developed mathophobia or the fear of math. They are convinced that they never have been able to - or never will be able to - be at ease with handling numbers. When confronted with computations, quantitative data, and words like "proportion," "percentage," "variance," "curve," or "exponential," their immediate reaction is "I can't do this," or "I hate math" - thoughts which shuttle them into avoiding math situations at all costs. Such people are found everywhere; they refuse to balance [illegible] checkbooks, find excuses not to move into management where they [illegible] budgeting responsibilities, add an order ten times to make sure it is right, and take as little math as possible in school, even if that involves changing majors. When they find, despite all wiggling and twisting, that they have been caught having to confront numbers, they often freeze - experience what has been termed "math anxiety."

What causes mathophobia? Usually it is because somewhere in school the students panicked because they felt they were no longer in control - and loss of control came into being simply because they did not have a "math mind." The "math mind" myth is that certain people can instantaneously get right answers without struggle and frustration, that they immediately understand that ambiguous math language - all those symbols representing ideas that are hard to visualize concretely in words or pictures. Many math avoiders felt their first loss of control when trying to learn fractions.

Contributing to the building of math anxiety is the way math is taught. Tension is created because there is always just one right answer, no room for discussion or guesswork. And horror of horrors - to perform at the blackboard where one's inadequacy can be exposed to the teacher and peers is the darkest nightmare of all. Tension is created by time tests where lots of right answers must come fast. Tension is created

because math skills build upon each other. If a student has chicken pox when a concept is being taught or simply felt confused by a concept, he/she suddenly feels lost the rest of the semester.

Mathophobia shows no preference - it can be caught by both sexes. When both sexes are asked how much they like math, there is no significant difference in their responses. Adult courses offered in cosmopolitan centers, carrying such names as "You Can Do Math Even If You Hate It," find themselves swamped with men who feel they have cut themselves off from management opportunities.

Despite the fact that both males and females experience mathophobia, males in general take much more math than females do. Part of this difference comes from the traditional myth relayed by society that "males are better at math than girls" or "math is for boys." Boys with mathophobia receive messages that they had better stick it out. It is unmanly to admit you don't understand math. It is necessary to learn more because of the kinds of careers in which they envision themselves.

Girls with mathophobia are told it is okay; girls aren't supposed to understand such things. Even girls who enjoy math may hesitate to go on because they would be weird, out of step with peers. After all, they do not have to be as concerned as boys in worrying about future careers.

In 1979, Joanne Becker for her work at the University of Maryland decided to explore if the society's differential expectations for males and females unconsciously affected how math teachers related to their geometry students. She found that teachers involved males in more interaction of all kinds, both academic and non-academic. They were called upon more often to answer questions. They received more feedback, more encouragement in academic pursuits, more teacher-initiated individual help. They received more clues to assist when wrong answers were given. Overall, females were less visible in the classroom and received little

help to positively stimulate them toward further math study.

Are males better than females at math? Through the eighth grade, boys and girls demonstrate equal achievement in math. It is often argued that during the high school years males start scoring better on standardized tests than females do - and the difference spread increases with time. ---***--- Counter arguments point out that no control is given for the number of courses taken; since males go on to take more math courses, they will naturally start scoring higher. Other reasons presented involve the different experience backgrounds between the sexes. Boys are exposed to more mathematical games and activities outside of school. Boys are encouraged to build things and thus develop greater spatial visualization. Boys are taught to plunge in and try new things without panicking when they don't understand it all before starting - developing more self-confidence that they can handle the unfamiliar and learning more problem-solving skills.

*** Show transparency: "Sex Differences in Math Skills"

Which side wins the debate is inconsequential for the vast majority of math-related and science-related occupations. There is no question that both men and women are capable of acquiring sufficient math knowledge and skills to handle job demands, for most jobs do not demand a love of math or science, just the mind set to feel non-threatened when faced with numbers and understandings of how the world works.

How can we as school personnel encourage our students to keep their career options open by taking more science and math? First, we can find ways to identify which of our poor or non-math students suffer from mathophobia. I am going to hand out a sampling of types of questions that can be asked of students. ---***--- Math anxious students will tend to disagree with the odd-numbered statements and agree with the even-numbered statements.

*** Distribute handout: "My Feelings about Math"

Suppose you find that some of your students, whether they be

secondary, post-secondary, or adult level, have bad cases of mathophobia. How can you counter this anxiety? Remember, math anxiety came about because people felt they had lost control. To counter, you need to give back the feeling of control.

There are several strategies that teachers have used to help students feel that they are back in control. I am going to distribute a list of some of these strategies. ---***--- Take a minute or two to look over the list. These strategies have been used by teachers in a variety of ways. Some have been alternatives incorporated into the current classroom curriculum. Some have been the bases of week-end workshops to convince adult learners that they can unlearn their dislike of math. Some have been non-credit college offerings where students can become upgraded in math skills and realize that they can handle college level math courses - opening up greater options when selecting majors. Some colleges, particularly smaller ones, have incorporated the strategies into a beginning math course in which students earn credit. Usually, some method of identifying students who need to build confidence in math is part of the program. As you look over the list, are there any comments or reaction?

*** Distribute handout: "Strategie to Counter Math Anxiety"

Today, over half of the women 16 or older are in the work force. The number of women assuming wage earning responsibilities has rapidly increased each year. A high school girl can expect to spend close to forty years as a wage earner. Today, girls as well as boys need to consider seriously a future career.

Because of this, there has been particular concern about girls taking less math than boys, for the girls are closing off even more career options than boys are. Women currently in traditionally male fields or in higher levels of traditionally female fields such as social sciences, nursing, and humanities, convey the same message to their

younger sisters: "Take all the math and business courses you can. It makes it doubly hard to make it when you don't." Apprenticeship programs that are currently pushing to accept more women find that many who are interested possess math and science skills lower than the minimum standards for acceptance into many of the blue collar trades.

There have been several strategies attempted to encourage women to take more math and to consider math-related and science-related careers. One strategy front is remediation. The assumption is that women are kept from math-related and science-related careers because of lack of skill or lack of confidence in their ability. Opportunities to acquire the missing math skills are created at post-secondary levels and in workshops for older women. Most of these programs combine overcoming anxieties about math with "catching up."

A second strategy front is career selling. The assumption is made that women ignore math-related or science-related careers because they do not know about the wide variety of career options or see these non-traditional careers as unfeminine and at odds with their self-image. This strategy provides career information, especially resources that portray women in non-traditional areas. The word is spread through bulletin boards, displays, or blurbs in newspapers or on radio. Role models can be heavily drawn upon to serve a double purpose: they are living examples of women in non-traditional roles who have not lost their femininity. Role models can be brought from the community to classrooms, or students can visit them at their work site. Role models should encompass a cross section of careers, life and family styles, educational backgrounds, and ages.

This career selling strategy can be incorporated into classrooms from elementary through post-secondary. It can be a feature in work shops for older women. Some college programs utilize a form of this

strategy by using upper-class females enrolled in engineering, math, and science to participate in outreach activities to junior and senior high girls.

A third strategy front is career and self-awareness activities. The assumption is made that women have a more complicated task than just matching interest and ability with occupations in making their career choices. Career decisions also involve desired and expected life styles and their realistic personal goals, including roles as parent and spouse. Young women who conceive of their life as marrying and raising children are made aware that they are looking at only the first half of their adult life. Women are assisted in making choices about the degree to which she will pursue a career and how to mesh the career with the other parts of her life. Role models can be used to show how non-traditional careers can be combined with spouse and family in a variety of ways. This strategy of career and self-awareness activities is often offered through counseling services as a support activity. Or it is often incorporated into outreach activities for adult women.

A fourth strategy front concerns itself with the job-seeking process. The assumption is that women may not know how to seek, find, and be selected for a job within a non-traditional career area. Counselors or teachers of potential completers teach women how to write a resumé, how to be selected for interviews, and how to be an assertive interviewee. They prepare women to counter effectively any discrimination they may find during the process.

Schools, workshops, programs, or projects concerned with encouraging more women to consider math-related and science-related careers may choose to concentrate on just one of the four strategies of remediation, career selling, career and self-awareness activities, or job seeking. Or they may choose to draw upon a mixture of the four. Which

strategy or strategy combinations are selected depends on the goals and available resources for each effort. I will distribute a list of some current and past efforts to encourage women into math and science. -***- If your site is interested in making your own effort, this list can steer you to possible sources that may give guidance.

*** Distribute handout: "Efforts to Encourage Women into Science and Math"

Your site may be most concerned with encouraging all its students to take more math or science. Or your site may be most concerned with encouraging women to consider math-related or science-related careers. Or your site may be most concerned with assisting older adult women become employable. Or your site may be most concerned with increasing and/or retaining its student population. Whatever your site's goals and objectives, through efforts toward making mathematics and science open for a larger population, you are also expanding career options for potential wage earners. Armed with this increased flexibility, these potential wage earners will be better prepared for roles they face in the future.

SOME SCIENCE AND RELATED OCCUPATIONS

Aeronautical Technician

Agronomist

Aircraft Mechanic

Air Traffic Controller

All-round Machinist

Anesthetist

Animal Caretaker

Automobile Mechanic

Broadcast Technician

Camera Repairperson

Chiropractor

Computer Service Technician

Dental Assistant

Dental Hygienist

Dental Laboratory Technician

Dietitian

Electrician

Emergency Medical Technician

Farmer

Fish and Game Warden

Fish Hatchery Worker

Flight Engineer

Food and Drug Inspector

Food Scientist

Forester

Funeral Director

Home Economist

Horticulturist

Instrument Maker (Mechanical)

Instrument Repairperson

Laboratory Technician/Assistant

Landscape Architect

Licensed Practical Nurse (LPN)

Medical Assistant

Medical Laboratory Technologist

Metallurgist

Nursery Worker

Nutritionist

Occupational Therapist

Operations Research Analyst

Park Naturalist

Physical Therapist

Physician's Assistant

Pilot

Plumber

Quality Control Inspector

Radiologic (X-ray) Technician

Recreational Therapist

Registered Nurse

Respiratory Therapist

Science Fiction Writer

Technical Secretary

Telephone Lineworker

TV and Radio Service Technician

Tool Designer

Tool and Die Maker

Veterinarian

Watchmaker

Wildlife Specialist

Wood Technologist

SOME MATH AND RELATED OCCUPATIONS

Accountant

Agricultural Engineer - Calculus

Air Traffic Controller - Algebra, geometry, trigonometry

All-around Machinist - Algebra, geometry

Architect - Calculus

Bank Cashier - Data Processing

Bookkeeper - Algebra, geometry

Broadcast Technician - Algebra, trig (work with electronics)

Business Teacher

Buyer - Business mathematics

Cashier - Business mathematics

Claims Adjustor - Business math beyond high school

Clerk - Business mathematics

Computer Programmer

Computer Service Technician

Construction Inspector - Geometry, blueprints

Credit Manager - Computer

Draftsperson - Calculus

Electrician

Engineers

Farmer - Managing farms is a business enterprise

Farm Manager

Food Scientist

Fund Raiser - Good business skills

Hospital Administrator

Hotel Manager - Accountant

Industrial Designer - Trig, mechanical drawing

Instrument Maker (Mechanical) - Algebra, geometry, trig, mechanics, electronics

Instrument Repair Person

Landscape Architect - Read, make, interpret blueprints

Manager, Business

Meteorologist (Weatherman)

Model Maker

Operations Research Analyst

Optician - Algebra, geometry

Patternmaker - Geometry

Pilot

Plumber - Shop math, algebra, geometry

Purchasing Agent

Quality Control Inspector

Real Estate Broker

Salesperson, Retail Trade - Numerical skills

Securities Salesperson

Surveyor

Systems Analyst - Solving complex problems

Tax Accountant

Tool and Die Maker or Designer

Traffic Manager

[illegible] Planner

[illegible]derwriter (Insurance)

TRANSPARENCY MASTER

SEX DIFFERENCES IN MATH SKILLS

	PRESCHOOL	ELEMENTARY	HIGH SCHOOL
COMPUTATIONAL SKILLS	No sex difference	Few sex differences (Females occasionally superior)	Minimal sex difference (Males occasionally superior)
SPATIAL RELATIONS SKILLS	No sex difference	Few sex differences (Males occasionally superior)	Male superiority
MATH REASONING SKILLS	No sex difference	Little research done	General male superiority

Source: Project On Sex Stereotyping in Education, Sex Stereotyping In Math Doesn't Add Up, Women's Educational Equity Act Program, U. S. Department of Health, Education, and Welfare.

HANDOUT MASTERS

MY FEELINGS ABOUT MATH

Below is a series of statements. There are no correct answers for these statements. They have been set up in a way which permits you to indicate the extent to which you agree or disagree with the ideas expressed. Circle the letter(s) corresponding to your response:

SA = Strongly Agree
A = Agree
U = Undecided or neutral
D = Disagree
SD = Strongly Disagree

Do not spend much time with any statement, but be sure to answer every statement. Work fast but carefully. Whenever possible, let the mathematics experiences that you have had help you make a choice.

1.	It wouldn't bother me at all to take more math courses.	SA	A	U	D	SD
2.	I get really uptight during math tests.	SA	A	U	D	SD
3.	I have usually been at ease during math tests.	SA	A	U	D	SD
4.	I get a sinking feeling when I think of trying hard math problems.	SA	A	U	D	SD
5.	I have usually been at ease in math courses.	SA	A	U	D	SD
6.	My mind goes blank and I am unable to think clearly when working mathematics.	SA	A	U	D	SD
7.	I almost never get uptight while taking math tests.	SA	A	U	D	SD
8.	Mathematics makes me feel uncomfortable and nervous.	SA	A	U	D	SD
9.	I usually don't worry about my ability to solve math problems.	SA	A	U	D	SD
10.	Mathematics makes me feel uneasy and confused.	SA	A	U	D	SD
11.	I don't avoid working on a problem just because it involves mathematics.	SA	A	U	D	SD
12.	Everyone knows I don't understand mathematics.	SA	A	U	D	SD
13.	Whizzes in math are as normal as anyone else.	SA	A	U	D	SD
14.	If I solve a math-related problem readily, I am suspicious of my answer.	SA	A	U	D	SD
15.	Math doesn't scare me at all.	SA	A	U	D	SD
16.	Mathematics makes me feel uncomfortable, restless, irritable, and impatient.	SA	A	U	D	SD
17.	I wouldn't mind having a mathematician for a good friend.	SA	A	U	D	SD

STRATEGIES TO COUNTER MATH ANXIETY

The purpose of the following strategies is to reduce anxiety and increase positive feeling for mathematics.

1. Focus not on right answers, but on methods of problem solving. Discuss options available that will solve a particular problem--and how each person should select the method that is most comfortable. Word problems are done daily so students relate to abstract and operational math as it relates to the real world. Excellent supplemental booklet: Noller, R. B., Heintz, R. E., and Blaeuer, D. A., Creative Problem Solving in Mathematics; D. O. K. Publishers, Inc., Buffalo, NY 14214. 1978, 50 pages.

2. Put emphasis on students' learning how to ask the right questions, not on finding the right answers.

3. Use a basic discovery approach - augmenting class work with puzzles, games, and computer activities to show that mathematics can be fun as well as challenging.

4. Make students aware that intuitive responses are not necessarily wrong. They should be explored to test whether they are shortcuts to solving.

5. Persuade learners that math abilities are not just inborn gifts. Even great mathematicians make errors and have experienced frustration. Everyone can learn to cope with numbers sufficiently to meet life demands.

6. Incorporate small-group work (usually about four students) to work on math problems. A variation of this may be to have the group complete an exam and turn in only one set of results. The peer support gives discovery that they are not alone in their disability and improves self-image and confidence about doing math.

7. Allow re-testing when students feel they have mastered the material.

8. Avoid time tests whenever possible.

9. Allow flexible remedial math opportunities whereby class members can cover any basic math concepts with which they feel uncomfortable, without feeling silly.

10. Along with the cognitive learning activities, incorporate activities by which students can get to know themselves, classmates, and the teacher better. The students then feel more comfortable and at ease, and free to ask questions about the math concepts that are confusing them the most.

EFFORTS TO ENCOURAGE WOMEN INTO MATH AND SCIENCE

Math, Science RESOURCE CENTER, Mills College, Oakland, CA 94613
a consortium-based network and resource center with the goal to increase the participation of women in mathematical and scientific studies and to encourage them to prepare for non-traditional careers in math and science related fields. Funded by Carnegie Corporation. Sponsor 'Math for Girls', 'Equal Teacher Training', 'Women in Science', and 'Expanding Your Horizons'. These programs include a chance for girls from 6 to 14 to explore fundamental concepts and applications with women students majoring in mathematics, mathematics education, or computer science; conferences for young women from 12 to 18 years old; and pre-calculus courses for college students.

Collegiate Activities: Dr. Lenore Blum, Mills College, Oakland CA 94613
Pre-Collegiate Activities: Ms. Nancy Kreinberg, Lawrence Hall of Science, U.C. - Berkeley, Berkeley, CA 94720
Resource Center: Ms. Joanne Koltnow, Mills College, Oakland, CA 94613

Materials Developed:
Blum, Lenore, Count Me In: Educating Women for Science and Math, Newton, Mass: Education Development Center, 1978 (Videotape and Brochure produced for WEEAP)
Kreinberg, Nancy, I'm Madly in Love with Electricity: and Other Comments About Their Work by Women in Science and Engineering, Berkeley: Lawrence Hall of Science, 1977. (Career material)

Wesleyan Math Anxiety Project - a three-year project funded by Fund for the Improvement for Post-secondary Education (FIPSE). Pre-calculus courses. Sheila Tobias and Robert A. Rosenbaus, Directors, Wesleyan University, Middletown, Connecticut.

Kansas Activities
Smith, Walter S. and Stroup, Kala M., Science Career Exploration for Women, Washington, D. C.: National Science Teachers Association, 1742 Connecticut Avenue, N. W., Washington, D. C. 20009, 80 pp., $2.50. Efforts involved Kansas high school girls. Walter Smith is currently directing another project at Kansas University. Contact: Dr. Walter Smith, Associate Professor, Science Education, University of Kansas, Lawrence, KS 66044.

Smith, Caryl K., Smith, Walter S., and Stroup, Kala, Counseling Women for Non-Traditional Careers, Ann Arbor: Eric Counseling and Personnel Services, 1977 (Ed 150 533).

Faculty Advising
Reducing Math Avoidance For Women Students Through the Training of Faculty Advisers, A FIPSE funded program for faculty advisors to raise their awareness of mathematics as a filter for undergraduate women. Beverly Prosser-Gelwick, Director of Couseling, and Charles Stuth, Professor of Mathematics, Stephens College, Columbia, MO 65201.

Career Posters - include both men and women; free to teachers. General Electric Company, Educational Communications Division, Fairfield, CT 06431.

Values Clarification and Creative Problem Solving

Has explored usage of both in the mathematics classroom. David A. Blaeuer, Department of Mathematics, State University of New York, College of Buffalo, 1300 Elmwood Avenue, Buffalo, New York 14222.

The Oregon Mathematics Education Council

Conducts a variety of programs to help 'math anxious' teachers (often found in elementary teaching) become confident and competent math educators. Write to Barry Mitzinan, Oregon Mathematics Education Council, 325 13th Street N. E., Salem, Oregon 94301.

Outreach workshops for adult women:

Dr. Jerry Baker
Mathematics Department
Wichita State University
Wichita, KS 67208

Margaret Johnson
Department of Mathematics
St. Louis Community College
of Merrimac
11333 Big Bend
Kirkwood, MO 63112

Bernadette Baker
Math/CS Department
Drake University
Des Moines, Iowa 50311

Upcoming Aids

To disseminate information on math anxiety, FIPSE has awarded a grant to develop: a two-edition directory of math anxiety, math avoidance, and reentry mathematics courses, programs, and clinics (due January 1980 and August 1980); a manual for counselors; and a 'kit' for people fearful of math to use in assessing their own level of anxiety and level of math competence. Sheila Tobias, Director, The Institute for the Study of Anxiety in Learning, Washington School of Psychiatry, 1610 New Hampshire Avenue, N. W., Washington, D. C. 20009.